

# The coronavirus disease 2019 (COVID-19) - A global health emergency

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## ABSTRACT

The 2019 novel coronavirus (SARS-CoV-2) is a new strain of virus emerged in Wuhan Hubei, China in December 2019. The coronavirus disease (COVID-19) caused by the virus spread worldwide and results in hundreds of thousands of deaths and was declared a global pandemic on 11 March 2020 by WHO. Here we review the current literature on COVID-19 to understand its epidemiological, clinical, laboratory, radiological characteristics and management. We will also look at infection control and surveillance measures applied on a global level. Studies have shown a wide spectrum of severity and symptoms ranging from mild to severe respiratory symptoms. Human to human transmission and via droplets was reported and wearing masks, avoidance of public contact, hygiene practices and quarantines have been implemented in many countries to contain the disease. Quick laboratory tests COVID-19 have been developed and many supportive treatments were reported but to date, no proven effective treatment or vaccine is available.

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## INTRODUCTION

Coronaviruses (CoVs) are a large family of zoonotic viruses (transmitted from animals to humans). Severe acute respiratory syndrome coronavirus (SARS-CoV) that broke out in China in 2003 was reported to be transmitted from civet cats to humans, and the Middle East respiratory syndrome coronavirus (MERS-CoV) was also transmitted from dromedary camels to humans [1].

Infected humans would normally present cold/flu-like symptoms. In some cases, symptoms might

also present like severe pneumonia with severe acute respiratory syndrome (SARS). Cumulatively, CoVs have resulted in more than 10,000 cases in the past two decades, with a mortality rate of 10% for SARS-CoV and 37% for MERS-CoV [1].

The 2019 novel coronavirus (SARS-CoV-2) is a new strain not previously identified in humans that causes the coronavirus disease (COVID-19).

The virus emerged in Wuhan Hubei, China in December 2019 with a typical clinical picture of viral pneumonia [1,2]. The virus spread to other provinces in China, and outside China.

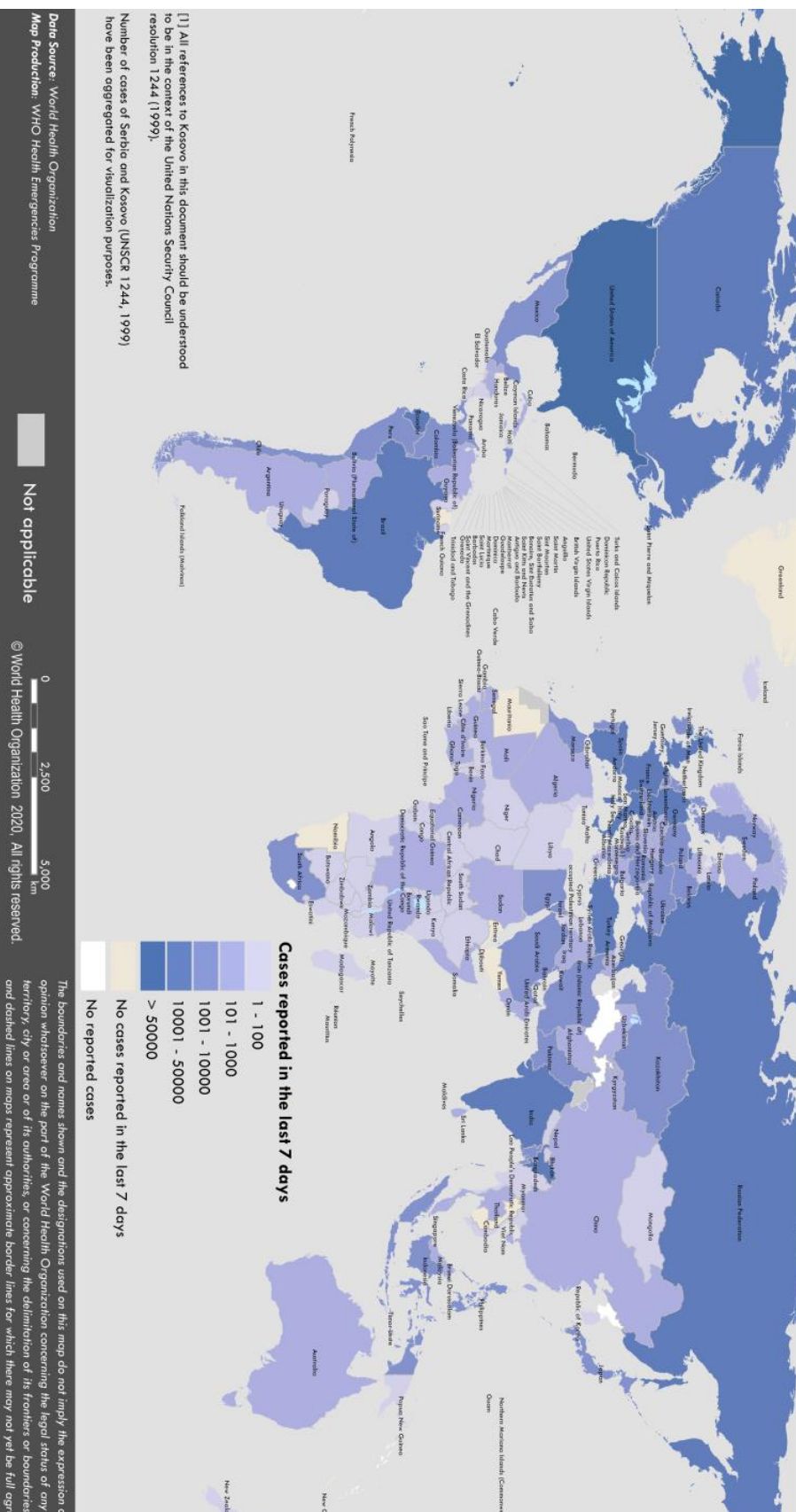
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# Countries, areas or territories with COVID-19 cases reported in the last 7 days



World Health Organization

(From 20 April 2020, 10:00AM to 26 April 2020, 10:00AM (CEST))



**Figure 1. Countries, territories or areas with reported confirmed cases of COVID-19, 26 April 2020 (WHO)**

The boundaries and names shown on this map don't imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or its authorities, or concerning delimitation of frontiers or boundaries. Dotted or dashed lines on the map represent approximate border lines for which they may not yet be full agreement.

In January 2020, following the rise in epidemiological statistics, COVID-19 was declared a public health emergency of international concern (PHEIC) by the World Health Organization. After spreading to 114 countries, it was declared a global pandemic on 11 March 2020 [3,4,6].

### EPIDEMIOLOGICAL AND CLINICAL CHARACTERISTICS

Studies have shown the virus' origination to be in connection to a seafood market in Wuhan, China [10-15]. The population with poor immune function such as older people, diabetics, those with heart or lung diseases, renal or hepatic dysfunction, are at higher risk for more serious complications from COVID-19 [16].

It was found that in Italy as in France, there were more deaths among people aged at least 70 years compared to China [13,14].

While the infection curve in China began to reach a plateau on the 29th day (February 12) then decrease gradually from the 39th day, In Italy, an inflection occurred on the 20th day (March 11).

In France, the trend remains in an exponential progression. This is the same as the global. In Spain, the evolution of the number of deaths follows a similar but faster exponential progression [14].

The virus is transmitted through droplets and close contact (similar to the transmission of the common cold) or by contact with contaminated objects and surfaces. Persons in the incubation period carry the virus and may be contagious, giving COVID-19 a stronger transmission competence. The incubation period is wide; it ranges from 2-14 days and the symptom onset is, on average, 5-6 days [4].

This characteristic enabled COVID-19 to cause tens of thousands of cases in both China and other parts of the world becoming a pandemic (Figure 1) [5].

As of 26 April 2020, the total number of confirmed cases was over 2,800,000 confirmed cases and over 193 700 deaths (Figure 2) [12].

Common signs of infection include fever, dry cough, fatigue and difficulties in breathing. Myalgia or fatigue was also found common. At least 2 in 3 confirmed cases in Germany, and 30% of patients testing positive in South Korea, have developed the loss of sense of smell [17]. Sputum,

headache, hemoptysis, nausea, and diarrhea are less common. Severe infection can cause severe pneumonia, severe acute respiratory syndrome (SARS), kidney failure and even death [1,2]. In a single-centre case series of 138 hospitalized COVID-19 confirmed patients in Wuhan China, 26% of patients received ICU care due to SARS, and mortality was 4.3% [2]. Patients who required ICU care were older compared to the patients who didn't [1,2].



Figure 2: Situation in numbers globally, 26 April 2020 (WHO)[12]

Clinical manifestations in children with COVID-19 were found to be non-specific and milder than those in adults. These were mainly caused by the family cluster outbreak [4].

WHO published the guidance on clinical management of severe acute respiratory infection when COVID-19 is suspected.



This guidance describes, in detail, all interventions from triage to special considerations for pregnant patients [6]. Common complications included shock, ARDS, arrhythmia, acute cardiac injury and acute kidney injury [1,2].

## LABORATORY CHARACTERISTICS AND RECOMMENDATIONS

WHO recommends taking lower respiratory specimens (sputum, endotracheal aspirate, or bronchoalveolar lavage) for detecting COVID-19 infection.

If initial testing is negative in a patient strongly suspected, specimens are collected from multiple respiratory tract sites (nose, sputum, endotracheal aspirate) and in addition, blood, urine, and stool may be collected. More WHO recommendations are available at [http://www.who.int/csr/resources/publications/biosafety/WHO\\_CDS\\_CSR\\_LYO\\_2004\\_11/en/](http://www.who.int/csr/resources/publications/biosafety/WHO_CDS_CSR_LYO_2004_11/en/)

The presence of SARS-CoV-2 in respiratory specimens can be detected by next-generation sequencing or real-time reverse-transcriptase polymerase chain (RT-PCR) methods but other tests may be conducted in cases of complications like blood counts, liver or kidney function tests.

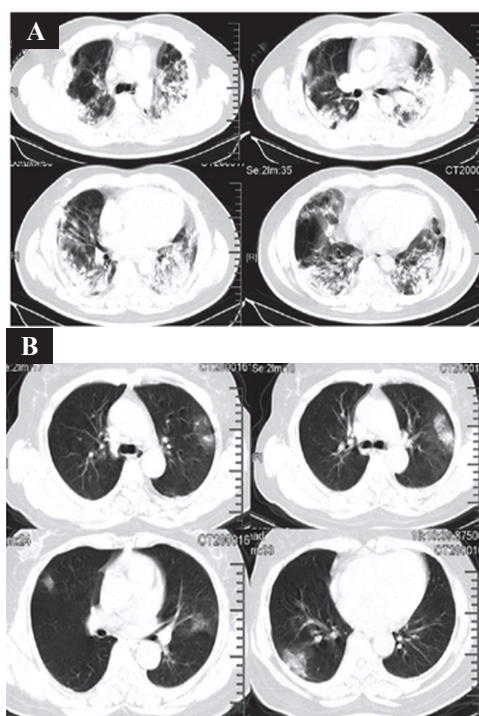
WHO has published a draft code of conduct for the handling of Genetic Sequence Data related to outbreaks (<https://www.who.int/blueprint/what/norms-standards/GSDDraftCodeConductforpublicconsultation-v1.pdf?ua=1>) and Serological testing may be useful to confirm immunologic response [2].

In a study done in China, blood counts of patients on admission showed leucopenia and lymphopenia, higher levels of prothrombin time and D-dimer and increased aspartate aminotransferases [1], increased lactate dehydrogenase, higher creatine kinase, and creatine [2].

The COVID-19 was found to be present in saliva which makes saliva a noninvasive specimen for diagnosis [8].

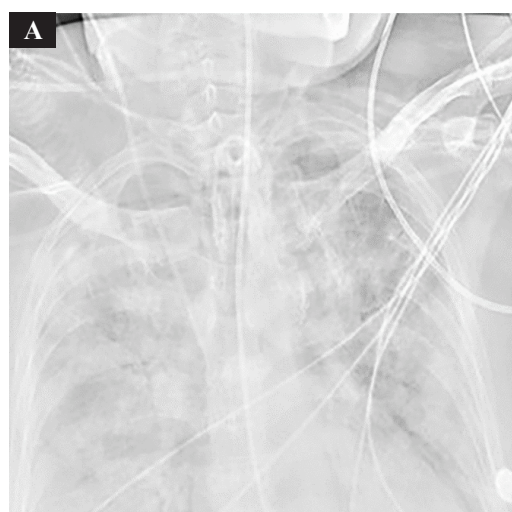
## RADIOLOGICAL CHARACTERISTICS

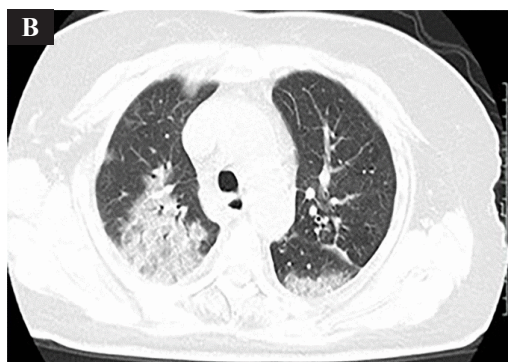
The typical findings of chest CT images are bilateral multiple lobular and subsegmental areas of consolidation bilateral ground-glass opacity (figure 3).



**Figure 3:** (A) Transverse chest CT images from a 40-year-old man showing bilateral multiple lobular and subsegmental areas of consolidation on day 15 after symptom onset. Transverse chest CT images from a 53-year-old woman showing bilateral ground-glass opacity and subsegmental areas of consolidation on day 8 after symptom onset (B) [1].

In a systematic review of compiled literature on CT characteristics of COVID-19, it was found that septal thickening, bronchiectasis, pleural thickening are some of the less common; and pleural effusion, pericardial effusion, lymphadenopathy, cavitation, pneumothorax may be seen with disease progression (Figure 4) [3].





**Figure 4:** A 79-year-old woman diagnosed with COVID-19 (Courtesy of Song F, Shanghai Public Health Clinical Center, Shanghai, China). Chest radiograph (A) and CT-Scan image (B) obtained on day 4 show airspace consolidation [9].

## TREATMENT AND CLINICAL OUTCOME

There is no vaccine or antiviral treatment for human and animal coronavirus to date. Active symptomatic support remains key to treatment.

Recommended antiviral drugs such as IFN- alpha (5 million units twice a day) and lopinavir/ritonavir (400 mg/100 mg twice a day) would be helpful. There are other many drug options that came from experience treating SARS [10].

Chloroquine phosphate, an old drug for the treatment of malaria, has shown possible efficacy against COVID-19 associated pneumonia in multiCentre clinical trials conducted in China [11]. In-vitro studies have shown chloroquine to be effective against SARS-CoV-2 and severe adverse reactions were reported to occur when prescribed doses are higher than required for malaria [18].

Symptomatic treatments may include oxygen therapy and ventilation, anti-inflammatory drugs as well as antibiotic treatment in a case of secondary infection [1,7].

In a study conducted in China, 68% of patients previously hospitalized showed improvement to different supportive treatments and were discharged following at least 10 days of treatment without fever, with improvement of chest CT images and viral clearance in respiratory samples [1].

## INFECTION PROTECTION AND CONTROL

After spreading of the coronavirus around the world, one country after another adopted measures to stop COVID-19 from spreading [13].

They stopped schools, sports events, religious services, non-essential businesses and travels as well as other social gatherings.

While case numbers are progressively increasing in some countries, in others, first in Asia but increasingly in Europe, there is a decrease in cases indicating that the lockdown measures and social distancing efforts are working [15].

WHO developed a guidance on self-protection, and the use of protection equipment. This guidance is constantly updated as new information emerges about COVID-19 outbreak and are all accessible at <https://www.who.int/emergencies/diseases/novel-coronavirus-2019> WHO quickly published advice on the use of masks in the community, during home care and in healthcare settings in the context of the COVID-19 outbreak. This publication focusses on information needed by public health and infection prevention and control professionals, healthcare managers, healthcare workers and community health worker about the appropriate use of masks [12].

Advice for the general public on protective measures is published in text, videos or images on <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>

It gives details on appropriate hygiene and travel precautions, social interactions, and health alerts to go to hospital (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>).

WHO recommends social distancing, regularly washing hands with cleansers and recommend people to avoid touching eyes, nose or mouth with hands.

Countries around the world have adopted measures to contain the virus and have released recommendations to their citizens to reduce the COVID-19 transmission.

For instance, Rwanda through the Rwanda Biomedical Centre (RBC) published public advice and recommendations in a case of sickness with COVID-19 and for reduction of infection risks (Figure 5). COVID-19 symptoms and Guidance for self-isolation (Figure 6) are also publicly available at <https://www.rbc.gov.rw/index.php?id=707>.



Figure 5: Guidance for self-isolation (RBC)



Figure 6: Guidance for reducing the risk of infection

## MYTH BUSTERS

The WHO publishes information to bust some myths surrounding the outbreak and provides downloadable graphics to share (Figure 9). Myths and rumors can be damaging to public health and increase the risks of contamination since inaccurate information is a barrier to preventive and treatment measures.

Working with global experts to expand scientific knowledge on COVID-19 and to disseminate information from and legal reliable sources tasked to fight COVID-19 as well as is crucial to dispel the myths. For more myth busters, visit <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/myth-busters>



Figure 9: Some examples of myth busters published by WHO on its website



## ONLINE TRAINING ON COVID-19

The WHO Health Emergencies Program (WHE) developed online trainings as a weapon to fight the COVID-19. The course is free and available to anyone on OpenWHO.org in different languages and the introductory video to the course was posted on YouTube. This course was established to assist UN country teams in scaling up country preparedness and response to COVID-19 and to go with the Operational Planning Guidelines to Support Country Preparedness and Response (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/training/online-training>). In addition, WHO published the simulation exercise simulation guideline preparedness and response to COVID-19 (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/training>).

## GLOBAL SURVEILLANCE

The guidance on Global Surveillance for human infection with the the COVID-19 is available and regularly updated to help countries in monitoring the disease outbreak, rapidly detecting new cases in countries providing epidemiological information to conduct a risk assessment at the national, regional and global level and to guide response measures [13].

WHO requests that national authorities report probable and confirmed cases within 24 hours through the National Focal Point and the Regional Contact Point for International Health Regulations

## REFERENCE

- [1] C. Huang et al., "Articles Clinical features of patients infected with 2019 novel coronavirus in Wuhan , China," pp. 497–506, 2020.
- [2] D. Wang et al., "Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus–Infected Pneumonia in Wuhan, China," JAMA, Feb. 2020.
- [3] W. Library, "Coronavirus (COVID-19)," vol. 6736, no. February, 2020.
- [4] WHO, "Coronavirus disease 2019 ( COVID-19 ) Situtation report," vol. 2019, no. February, 2020.
- [5] T. Huaiyu, "2019-nCoV: new challenges from coronavirus," vol. 54, no. 3, pp. 233–236, 2020.
- [6] World Health Organisation, "Clinical management of severe acute respiratory infection when novel coronavirus ( 2019-nCoV ) infection is suspected," pp. 1–11, 2020.

at the appropriate WHO regional office by using a template found at [https://www.who.int/publications-detail/global-surveillance-for-human-infection-with-novel-coronavirus-\(2019-ncov\)](https://www.who.int/publications-detail/global-surveillance-for-human-infection-with-novel-coronavirus-(2019-ncov)) [4].

**Limitations:** Since Covid-19 was identified in December 2019 in Wuhan, China, it has spread rapidly worldwide and has shown a very wide spectrum of symptoms and severity.

Although there has been evolution in the scientific knowledge about the pandemic, there is still a gap in scientific knowledge on the virus. This shows a need of extensive scientific research to accurately prove the data reported.

Our survey focused on the articles published in English during the first 4 months of the outbreak and it cannot reflect the entire body of research on COVID-19 worldwide.

In conclusion, the COVID-19 still needs to be studied deeply to help provide a good clinical description for clinicians and viral evolution, infectivity, transmissibility, and pathogenicity needs to be carefully studied and understood to develop treatment, and guidelines that can help in the fight against the pandemic.

Currently, the approach to the COVID-19 pandemic is to control the transmission of infection, use of personal protection precaution and early diagnosis, isolation, and supportive treatments for affected patients. Antibacterial agents are ineffective.

- [7] W. H. O. Surveillance and A. Sops, "Laboratory testing for 2019 novel coronavirus ( 2019-nCoV ) in suspected human cases Interim guidance," no. January, 2020.
- [8] K. K. To et al., "Consistent Detection of 2019 Novel Coronavirus in Saliva," no. Xx Xxxx, pp. 4–6, 2020.
- [9] H. Lu, "Drug treatment options for the 2019-new coronavirus (2019- nCoV)," pp. 10–12, 2020.
- [10] World Health Organization, "Advice on the use of masks in the community , during home care and in healthcare settings in the context of the novel coronavirus ( 2019-nCoV ) outbreak," vol. 2020, no. January, pp. 2019–2020, 2020.
- [11] B. Patient and M. States, "Global Surveillance for human infection with novel," no. January, pp. 2019–2020, 2020.
- [12] N. Mariana, "Coronavirus disease 2019 ( COVID-19 )," vol. 2019, no. April, 2020.

- [13] L. Cor, “La démographie des décès liés à la pandémie COVID-19 Collectif de l’INED – 27 mars 2020,” vol. 33, no. 0, pp. 20–22, 2020.
- [14] S. I. N. Numbers, “Coronavirus disease 2019 ( COVID-19 ),” vol. 2019, no. April, 2020.
- [15] E. Address, “Ending coronavirus lockdowns will be a dangerous process of trial and error Email Address \*,” pp. 1–12, 2020.
- [16] S. P. Adhikari et al., “Epidemiology , causes , clinical manifestation and diagnosis , prevention and control of coronavirus disease ( COVID-19 ) during the early outbreak period : a scoping review,” pp. 1–12, 2020.
- [17] S. Korea and S. Korea, “Loss of sense of smell as marker of COVID-19 infection,” pp. 19–20.
- [18] N. Principi and S. Esposito, “Correspondence Chloroquine or hydroxychloroquine for prophylaxis of COVID-19,” *Lancet Infect. Dis.*, vol. 3099, no. 20, p. 30296, 2020.